Effectiveness of Balance Training on Quality of Life among Osteoarthritis Knee

Dhanushiya Sarangapani¹, Kotteeswaran K²

¹Post Graduate Student, ²Professor, Saveetha College of Physiotherapy, Saveetha Institute of Medical & Technical Sciences, Chennai, Tamilnadu, India.

How to cite this article: Dhanushiya Sarangapani, Kotteeswaran K. Effectiveness of Balance Training on Quality of Life among Osteoarthritis Knee. Indian Journal of Physiotherapy and Occupational Therapy / Volume 18 Special Issue 2024

Abstract

Background of the Study: Osteoarthritis of knee is defined as a degenerative disorder of muscular and skeletal region that causes pain, stiffness and increasing loss of function cause decreased Balance and Quality of Life (QoL). Studies has also found that an increased chances of fall risk in patients with OA knee. Balance training impacts the improvement of functional ability and the quality of life in patients with osteoarthritis knee.

Purpose: The main purpose of this study was to evaluate how well balance training affected the quality of life in OA knees.

Methods: 30 participants with knee osteoarthritis (OA) who matched certain inclusion requirements participated in the study. These subjects were randomly selected from two groups: Group A and B. Group A participated in conventional exercises, while Group B received a combination of conventional exercises and balance training. To assess the impact of the interventions, the Time Up and Go (TUG) test was used to gauge balance, and the subjects’ Quality of Life (QoL) was measured using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). These measurements were taken before and after the eight-week intervention period. During the study, each treatment regimen was administered three times a week for a total of eight weeks. The purpose of this research was likely to evaluate the effects of conventional exercises and balance training on balance and quality of life in individuals with knee osteoarthritis.

Result: At the completion of the intervention session, subjects who had Balance training had statistically better improvement of Balance and Quality of Life (QoL), group B, WOMAC (mean=61.13, SD= 1.59) and p value=0.0001) & TUG (mean=15.20, SD=2.41 and p value=0.0001).

Conclusion: The study concluded that the combination of conventional exercise with Balance training shows better outcomes in improving quality of life among patients with knee OA.

Keywords: Osteoarthritis, Balance, WOMAC, TUG, Quality of Life.

Introduction

Knee osteoarthritis is the most frequent kind of arthritis and one of the most prominent diagnoses in general practice. OA is the most frequent etiology for lower extremity impairment in older persons due to its propensity for lower extremity joints including
the knee and hip. According to the WHO Scientific Group on Rheumatic Diseases, 10% of global adults 60 and older have serious clinical conditions that may be associated to OA. Among those 60 years of age or older, 10% of men and 13% of females have symptomatic knee OA, according to statistics\(^1\).

Osteoarthritis (OA) is a condition characterized by isolated synovial joint areas of articular cartilage deterioration, as well as bone hypertrophied bone, bone spurs (osteophytes), increase in the density of the bone matrix (subchondral bone sclerosis), and swollen capsule\(^2\). For epidemiologic study, osteoarthritis OA could be defined in many ways like pathological studies, radiological imaging tests, or clinical evaluation. Among these radio-graphical study has acknowledged as most valued confirmation of OA\(^3\). About 3.3 to 3.6% of people worldwide suffer with OA. Only 8.9% of adult population had clinically severe osteoarthritis in the knee, hand, or hip, according to a research. Only around 15% of people has radiologically confirmed knee osteoarthritis report knee discomfort\(^4\). Additionally, over the past 20 years, the incidence of symptomatic knee OA has raised by 4.1% and 6%, respectively, in men and women\(^5\).

According to an analysis, the long-term chance of having manifesting knee OA was 47% for women and 40% for men, with higher risks associated with obesity\(^6\). Based on current suggestions, in adults over the age of 40 has wear and tear knee pain, morning stiffness, limitation function, and examination findings like crepitus, limited motion, enlargement of bone, and a certain evaluation of knee OA can be made with a radiographic study\(^7\). There are both internal and external risk factors for osteoarthritis, according to epidemiological studies. Undoubtedly genetic variables are involved\(^8\). Systemic risk factors for OA include gender, age and hormonal substances, racial or congenital/developmental disorders, and food. Local risk factors include being overweight, injury/surgery, work, daily activity/sports, mechanical problems, and instability\(^9\).

Physical function loss and diminished muscle strength are common deficits in people with OA knee. Additionally, people with KOA typically lose their sense of balance, possibly as a result of damaged articular cartilage and defective mechanoreceptors\(^10\). When compared to their healthy contemporaries, people with knee OA experience lower quality of life and reduced activities of daily living, such as a reduced capacity to walk and a higher risk of falling\(^11\). A thorough review found that OA significantly affects quality of life (QoL) in OA knee\(^12\).

Treatment aims to reduce disease symptoms and signs and, if at all feasible, slow the disease’s course. From basic measures, physiotherapy, musculoskeletal devices, or orthotic aids, medication such intra-articular injection, and eventually surgery and rehabilitation, the therapeutic spectrum includes. “Prevention is the optimal treatment for knee osteoarthritis”\(^13\).

**Aim**

The aim of the present research compares the Effectiveness Of Balance Training with conventional exercise On Quality Of Life Among Osteoarthritis Knee.

**Materials and Methodology**

A total number of thirty individual were selected by simple random sampling method. Samples were selected from the outpatient department of Saveetha Medical College Hospital, Thandalam, Chennai according to inclusion and exclusion criteria. The selected individual was split into two groups which is named as Group A and B. The total duration of the study was eight weeks which is from June 2022 to August 2022. In this study balance is evaluated through Time Up and Go Test while Quality of Life is analyzed via WOMAC which is stands for Western Ontario McMaster Universities OA Index (WOMAC) Questionnaire.

**Inclusion criteria:**

- Age group 55 to 70 years.
- Both gender “Male” and “female “
- Chronic knee pain ≥3 months
- WOMAC scale - 70-80
- TUG Test– 20sec. to 30sec.
- Difficulty to maintain the general body balance
Exclusion criteria:

- Previous history of knee joint surgery/lesion
- Lower limb nerve pain
- Balance-related vision, inner-ear vestibular problems, proprioceptive nerve injury, or lesion within the previous six months.
- High severity knee OA that made it difficult for them to stand
- Atypical neurological conditions
- Failure of cardiopulmonary system or stroke history or History of vertigo
- Recent trauma to the affected knee joint.
- Recent wound injuries around knee
- Skin inflammation, infection

Outcome Measures

The Time Up and Go (TUG) Test and WOMAC which stands for Western Ontario McMaster Universities OA Index (WOMAC) Questionnaire was the two outcome measures of the study.

Procedure

With simple random approach, collectively 30 patients were chosen based on the requirement for being included and excluded. Before beginning of the study’s process, each participant provided written informed consent after being told about the study. Patients in both groups received information regarding osteoarthritis of the knee as well as protective suggestions (ergonomic advices) for the knee. The pre-test was assessed by WOMAC index and TUG test, and the post test will be assessed at the sixth week’s end. The subjects received the treatment for eight weeks of three sessions per week. Through random selection method of two distinct groups of those participating in the study were formed. The subjects in group A termed as conventional group, received the conventional exercises; The subjects in Group B termed as Experimental group, received the Balance training along with conventional exercises, eight weeks of three exercise sessions per week, and the participants were reassessed after eight weeks with WOMAC questionnaire and TUG test.

GROUP A

Subjects in Group A was directed to be in supine position to do the conventional exercise.

I. Conventional Exercise Program

1. Quadriceps exercises that are static
2. Hamstring and -quadriceps muscle exercises that involve active stretching and range of motion.
3. Isometric workouts for the hamstrings.
4. Ankle pump - Active
5. Knee exercises for short arc terminal extension. Exercises using isometric contractions for 10s and 2s of rest were used. 10 repetitions of isotonic exercises were performed.

GROUP B

Subjects in Group B was directed to do the Balance training along with the conventional exercises.

II. Balance Exercise Program

1. Up and down on a standard four-step staircase
2. placing your feet at shoulder-width apart while standing, stretch your hands just front of your shoulder. Try to maintain the position for 10s while lifting both heels off the ground.
3. Hold the arm in a similar position as indicated in the earlier exercises while standing with your feet shoulder-width apart. Try to maintain the stance for 10s by placing one foot inside the other’s ankle.
4. Hold a one-legged standing with one foot lifted behind you and the other leg bent 90 degrees. Try to hold that position for at least three seconds.
5. Stand with your feet slightly wider than your shoulders and your hands behind your back. Try to maintain the position for 10s while lifting both heels off the ground.
6. Repeat the previous exercise while lifting one foot in front with the non-weight-bearing knee flexed and raised to the height of the hip.
7. Along a line drawn on a typical floor, step from heel to toe.
8. Unsupported one (relatively small) leg lifts to the front and back are performed with the knee straight but not hyper-extended. Front and back continued to alternate.

Participants were also told to stand in six various positions for static exercises (examples: 1, 2, 3, 5, 6, & 8 as shown):

1. On the floor with open eyes, neutral head position and the same with closed eyes.
2. On the floor with open eyes, head slightly tilted back and the same with the closed eyes.

Unsupported one leg lifts to the front and back are performed with the knee straight but not hyper-extended. Front and back continued to alternate.

DATA ANALYSIS

In this study, Statistical Package for the Social Sciences SPSS 27.0 version was used for statistical analysis. The normality was assessed using Shapiro-Wilk test. The Western Ontario Mc Master Scale and Time Up and Go values was found to be normally distributed. For the statistical evaluation, both the independent and paired t tests were carried out. The significant results were confirmed if p<0.05.

INTRA-GROUP PAIRED T-TEST

INTERPRETATION: Graph 1 shows that the values are extremely statistically significant.
GRAPH 1 shows the comparison of intra-group analysis of Western Ontario Mc Master Scale values for Group A and Group B. The standard deviation and mean of post-test values of WOMAC for Group A (70.76 ± 2.32) which was increased to post-test values of Group B (61.13 ± 1.59) using Shapiro-Wilk test. As a result, the findings are statistically noteworthy with a p value of less than 0.0001.

INTRA-GROUP PAIRED T-TEST

INTERPRETATION: Graph 2 shows that the values are extremely statistically significant.

GRAPH 2 shows the comparison of intra-group analysis of Time Up and Go test values for Group A and Group B. The standard deviation and mean of post-test values of TUG for Group A (21.85 ± 2.41) which was increased to post-test values of Group B (14.96 ± 2.34) using Shapiro-Wilk test. Hence the results are statistically significant with a p value of < 0.0001.

Results

Total 30 people from all participants were selected and screened for osteoarthritis knee with reduced balance. They were grouped into two, each group has 15 individuals, Group B received treatment in addition to traditional exercises, while Group A received treatment only with traditional exercises. At the end of the treatment session, subjects who had Balance training had statistically better improvement of Balance and Quality of Life (QoL) , group B, WOMAC (mean=61.13, SD= 1.59) and p value=0.0001) & TUG (mean=14.96, SD=2.41 and p value=0.0001). This study reveals that the balance training along with conventional exercises reported a significant improvement in improving QoL and Balance that is been associated with the significant value of <0.0001.

Discussion

The purpose of the research was to determine how adding balance exercises to traditional exercises affected the quality of life (QoL) of OA knee patients. The total numbers of subjects were 30, 15 subjects in each group, allocation was done by Random Sampling method. In Group A there were 3 males and 17 females, where as in Group B had 16 female and 4 males. Group A received conventional exercises and Group B received Balance training along with conventional exercises in patients with OA knee on improving Quality of Life (QoL). Group shows significant improvement and there were no dropouts.

Lee et al.’s 2022 study highlighted the importance of balance control in daily activities. People constantly adjust their postures and centre of gravity to maintain balance on a stable foundation. Balance control involves both static steadiness and dynamic stability during complex movements, which are crucial for activities of daily living14.

In their 2015 study, Harshneet et al. investigated the effects of combining traditional treatments with balance exercises to improve the functional capacities of patients with knee osteoarthritis (OA). The research study aimed to conclude whether the addition of balance exercises to conventional treatments could enhance the functional abilities of OA knee patients compared to conventional exercises alone15.

Judith et al. in 2017, conducted randomized controlled trial of a single-blind method and tailored a balance training program’s effects on dynamic balancing and self stated bodily activity in people with medial tibiofemoral osteoarthritis were the focus of this investigation16.

Raposo et al. in 2021 has done a literature review on Exercise’s impact on osteoarthritis in the knee. The literature review aimed to explore the impact of exercise on functional and physical results in individuals with knee osteoarthritis, and to deliver current and excellent advice for treatment17.
Bobic et al. in 2018 evaluated that the balance confidence influences various Age-related activities of daily life (ADL) with osteoarthritis knee. And the author focused on understanding the relationship between balance confidence and the physical challenges faced by these individuals in their daily lives. The findings clears that older people with knee OA who had lower confidence in their ability to carry out physical activities experienced more difficulties in performing ADL.

**Conclusion**

The study’s final conclusion indicates that Group B, consisting of patients with knee osteoarthritis, experienced greater benefits from a combination of balance exercises and traditional exercises compared to traditional exercise alone. This conclusion is supported by the observed increase in scores in the TUG test, indicating improved balance, and a decrease in the overall WOMAC score, indicating reduced knee osteoarthritis-related disability, following the treatment program.

**Ethical clearance:** Approved by Institutional Scientific review board

**Funding:** self

**Conflict of interest:** Nil

**References**


